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## (54) DOOR FURNITURE SPINDLES

(71) We, NEWMAN TONKS LIMITED, a British Company of Hospital Street, Birmingham, B19 2YQ, do hereby declare the invention, for which we pray that a patent 5 may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement: —

10 This invention relates to door furniture spindles for use in fixing a pair of pull handles, each having a pair of spaced substantially parallel bores therein, at opposite sides of a door respectively. The use of 15 spindles to fix the handles affords greater security than merely fixing the handles independently at respective opposite sides of the door, since the spindles are concealed, and although other parts of the fixing may 20 be visible, removal of the handles is made difficult by the use of spindles in the fixing. With a known conventional method of 25 fixing using spindles and, for example, U-shaped pull handles, the limbs of each of the pull handles have respective threaded bores therein. Bores in the same handle have threads of the same hand, but the threads of the bores in one handle are of 30 opposite hand to those in the other handle. Each of two spindles is used to join a limb of one handle at one side of the door to an aligned limb of the other handle at the 35 opposite side of the door.

Each spindle has in integral, central non-circular, usually hexagonal portion, with threaded portions of opposite hand respectively at opposite sides of the hexagonal portion.

40 In use, holes are made through the door at a distance apart corresponding to the spacing of the bores in a handle. A spindle is inserted into each hole with the spindle threads of the same hand at the same side of the door. The handles are then presented up to the spindles so that the ends of 45 the spindles just fit in the ends of the bores.

To rotate the spindles to engage in the bores, either of two conventional methods are used. In one method, the respective

central portions of the spindles are disposed 50 within the door and holes are made inwardly from the adjacent end surface of the door to communicate with said central portion is then inserted through one of the holes and is used to rotate the spindle, thus 55 engaging the limbs of the handles thereon. The other spindle is similarly rotated.

Alternatively, the central portions of the 60 spindle can be arranged to be disposed at, and against, one side of the door. The central portions have respective collars non-rotatably fitted thereon. The collars conveniently having the same external cross-section as the limbs of the handles so that 65 they appear substantially as a continuation thereof. The collars are engageable by a special tool which enables the collars and thus the spindles to be rotated to engage the handles on the spindles. When the fixing 70 is complete the collars are visible at one side of the door.

This known manner of fixing two pull 75 handles, using spindles and using either manner of rotating the spindles suffers from a number of disadvantages.

Firstly, it is impossible for a spindle to 80 be rotated so that respective opposite limbs of the handles satisfactorily engage thereon, unless the bores in opposed limbs are coaxially aligned.

It has been found that in some instances 85 the bores in one handle are spaced apart by a distance slightly greater than the bores in the other handles. Thus, only one pair of bores can be aligned and thus the misaligned bores cannot be engaged by a spindle.

Even when the spacing of the bores is 90 the same for each handle, one of the bores may extend into its limb at an angle to the axis of the bore in the opposite limb. This again prevents engagement of a spindle in such opposed bores.

A second disadvantage, assuming it is possible to engage the handles on the spindles, is that the spindles must be rotated in turn, only a little at a time. If an attempt is made to rotate one spindle by more than about 95

three quarters of a turn, without rotating the other spindle, the spindle will bind and will not release until the other spindle is rotated. Thus the screwing of the handles 5 is obviously a time consuming operation.

A further disadvantage arises in that for 10 on site fixing, the handles are requested to be packed in pairs. However, since the only difference between a pair of handles is the hand of the screw thread, it is not possible easily and quickly to identify a pair of handles during the packing operation.

The object of the invention is to provide 15 a door furniture spindle for use in fixing a pair of generally U-shaped pull handles at opposite sides of a door respectively, which spindle overcomes at least some of the disadvantages mentioned.

According to the invention there is provided 20 a door furniture spindle for use in fixing a pair of pull handles, each having a pair of spaced substantially parallel bores therein, at opposite sides of a door respectively, the spindle comprising a portion by 25 means of which the spindle can be rotated, a tubular element on the spindle at one side of said portion, said tubular element being substantially restrained against axial movement on the spindle and being externally 30 screw threaded, the spindle at the other side of said portion having a further screw thread, and the tubular element having an internal diameter greater than the external diameter of the part of the spindle on which 35 it is disposed so that it can move radially relatively thereto or be inclined at an angle thereto.

Preferably the tubular element is freely 40 rotatable on said spindle.

The invention will now be described by 45 way of example with reference to the accompanying drawings in which:—

Figure 1 is a fragmentary cross-sectional view showing part of a spindle constructed 50 in accordance with the present invention being engaged in a bore in a limb of a pull handle, a collar for rotating the spindle also being shown.

Figures 2 and 3 are similar views to 55 Figure 1 showing a tubular element on the spindle engaged in the bore, the spindle being, in Figure 2, disposed at an angle to the bore axis, and in Figure 3 parallel to, but not co-axial with the bore axis, and

Figure 4 is a fragmentary end view of a door to which a pair of pull handles are fitted at opposite sides thereof respectively, on a reduced scale.

With reference to Figure 4 there is shown 60 a door 10 at opposite sides of which respective U-shaped pull handles 11, 12 are fitted, the handles having limbs 13, 14 and 15, 16 respectively. Also shown in Figure 4 at the respective ends of limbs of the handle 65 11 are collars 17, 18 for rotating the spindles

connecting the handles in the manner to be described.

Figure 1 shows the end of limb 13 of handle 11 with an internally screw threaded bore 19 therein. The axis of the bore 19 is parallel to the length of the limb. The limbs 14, 15 and 16 have similarly internally threaded bores, with the thread in the bores in the limbs 13 and 14 being of the same hand and, in this example, opposite to that of the thread in the bores of the limbs 15 and 16. Moreover, the bores in the limbs 13 and 14 are of equal diameter and of larger diameter than the bores in the limbs 15 and 16.

A metal spindle 20 shown in Figure 1 has an integral enlarged portion in the form of an hexagonal nut 21. At one side of the nut 21 the spindle has a short, unthreaded cylindrical portion 22 which joins a threaded portion 23 of which only a part is shown. The threaded portion may be interrupted along its length by short unthreaded portions (not shown) which constitute reduction points for the spindle in the normal way, so that the length of the spindle can be adapted to the width of the door with which it is to be used.

At the opposite side of the nut 21, the spindle has a short, unthreaded, cylindrical portion 24, co-axial with the portion 22. Fitted over the portion 24 is a tubular element 25 having an internal diameter larger than the external diameter of the portion 24. The element 25 is freely rotatable on the portion 24 but is substantially restrained against axial movement by the nut 21 in one direction, and a pair of washers 26 having the end of the portion 24 spun over onto them, in the opposite direction.

The tubular element 25 is externally screw threaded for engagement in the bore 19 and in this example, the threads on the element 25 and on the portion 23 respectively are of opposite hand. Figure 1 shows the clearance between the portion 24 and the interior surface of the element 25 and this clearance enables relative inclination to occur between the portion 23 and element 25 as shown in Figure 2. The clearance alternatively enables the spindle portion 24 to be moved radially relative to the element 25 to the position shown in Figure 3 where the axes of the element 25 and portion 24 respectively are parallel but spaced apart. The maximum external diameter of the element 25 is greater than the maximum diameter of the portion 23.

The end of the tubular element 25 adjacent the nut 21 has a pair of diametrically opposed notches 27 and the end of the nut 21 adjacent the end of the element 25 in which the notches are provided is machined to provide an annular groove 28. When the portion 25 is disposed co-axially with the

portion 24 as shown in Figure 1, the bottom surface of each notch 27 is level with the bottom surface of the groove 28. The groove provides access to the notches. 65

5 The collar 17 shown in Figure 1 is of the same circular external cross-section as the pull handles and has an axial bore of hexagonal cross-section therethrough to receive the hexagonal nut 21 in order to rotate the spindle. Equi-spaced around the periphery of the collar are three blind bores, one of which 30 is shown in Figure 1. The collars are slightly longer than the nuts. 70

10 To connect the pull handles 11, 12 at opposite sides of the door, the following procedure is adopted. 75

15 Firstly, a pair of holes are provided through the door, the distance apart of the holes being made equal to the distance apart of the bores in a handle. 80

20 The tubular element 25 on a spindle 20 is then screwed up, for example, by hand, into the bore 19. The final turns of the element 25 will be difficult to accomplish by 85

25 hand and a special tool (not shown) is used. This tool is in the form of a spanner having a generally U-shaped end. From the ends of the U, a pair of projections extend outwardly in parallel in a plane normal to the 90

30 general plane of the tool. In use, the tool is engaged onto the spindle so that the projections extend into the notches respectively in the element 25, the groove 28 providing access for the tool to said notches. The 95

35 U-shaped portion of the tool fits over the bottom surface of the groove 28 so that the tool can be rotated. Rotation of the tool in a plane normal to spindle thus causes the tubular element 25 to rotate, thus completing its engagement in the bore 19 as shown in Figure 2. 100

40 A tubular element 25 on another spindle 20 is similarly engaged in a bore in the limb 14. Of course, the tool can be used from the start of the engagement of the element 25 in the bore instead of screwing in by hand. 105

45 Once the elements 25 are engaged in the bores, the handle 11 is presented up to one side of the door 10 with the collars 17, 18 engaged over the nuts 21 on the spindle. The collars thus engage against the face of the door, as shown in Figure 4, with the portions 23 of the spindles protruding from 110

50 the other face of the door. 115

55 The handle 12, having bores in its limbs to receive the portions 23 of the spindles, is then presented up to the other face of the door so that the ends of the threaded portions 23 just engage in the respective bores in the limbs 15, 16 of the handle 12. The collars 17, 18 are then rotated, causing the portions 23 to rotate with the result that the handle 12 is received onto the spindles 120

60 until it reaches the position shown in Figure 4 when it contacts the face of the door. 125

Rotation of the collars can be carried out by hand or preferably, by means of a special tool which has projections which can be engaged in the bores 30 so that rotation of the tool causes rotation of a collar.

It will be appreciated that rotation of the nut 21 has no effect on the tubular element 25 of the spindle since it is freely rotatable on the portion 24 of the spindle.

The situation described assumes that the bores in the limbs 13, 15 and 14, 16 are co-axially aligned i.e. that the axes of all the bores are normal to the plane of the door and that the spacing of bores in the handle 11 is equal to the spacing of the bores in the handle 12.

As stated in the introduction, however, these spacings may not be equal and/or all the bores may not be normal to the plane of the door 10.

The spindle of this invention enables the handles to be fixed to the door even if such inaccuracies exist in the production of the bores in the handles.

If, for example, the bore in the limb 15 were inclined upwardly at a small accurate angle to the length of the limb 15, the portion 23 of the spindle 20 could still be engaged in such an inclined bore by virtue of the clearance provided between the element 25 and the portion 24 of the spindle. As can be seen from Figure 2, as the collar 17 is turned to rotate the portion 23, the portion 24 would become disposed at an angle 100 within the element 25, such an angle corresponding to the angle of inclination of the bore in the limb 15. Thus the limb 15 could be received onto the portion 23 since portion 23 and the bore in the limb 15 105 would now be co-axial.

Thus provided the angle at which a bore is inclined is not greater than the inclination permitted between the element 25 and remainder of spindle 20, a handle having an inclined bore in one of its limbs can still be secured.

Alternatively, the bores in the handle 11 might be spaced apart further than the bores in the handle 12. If the spacing of the bores in the handle 12 were, for example, the greater, the spindle 20 in the bore 19 could compensate as shown in Figure 3. In this case, the respective axes of the bores in the limbs 13, 15 are parallel 120 but not co-axial. Thus the spindle 20 would move radially bodily upwardly to take up the clearance provided between the element 25 and portion 24, until the spindle axis coincides with the axis of the bore in the limb 15. This may involve taking up the whole of the clearance as shown in Figure 3. Moreover, it may also be necessary to take up clearance at the lower

## WHAT WE CLAIM IS:—

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spindle also, if the spacing of the bores in the two handles were considerably different.

In an alternative possible method of rotating the spindles 20, the tubular elements 5 are engaged in the bores in the limbs 13, 14 and the handle 11 then presented up to the door so that the nuts 21 are disposed within the holes through the door. No collars are used, so that the end faces of the limbs of 10 handle 11 engage a surface of the door 10. The handle 12 is then presented up to the portion of the spindle protruding from the other side of the door.

To rotate the nuts 21, a tool adapted to 15 engage a nut 21 is inserted into a hole in the door extending inwardly from the end surface thereof to communicate with the hole in which the nut is received. A further tool is similarly engaged in a further hole 20 extending from the end face of the door, to engage the nut on the other spindle.

Rotation, in turn, of the nuts in a similar 25 manner to the rotation of the collars 17, 18 causes the handle 12 to be drawn onto the spindle and into tight engagement against the door. The tools are then withdrawn and the holes through which they were inserted filled in.

With this method of fixing, the spindles 30 are completely concealed and thus unauthorised removal of the handles is prevented.

Although in fixing the second handle, binding will still occur if one collar or nut 35 is turned too much in advance of the other collar or nut, a collar or nut can be turned considerably more than a three-quarter turn before binding occurs, because the clearance between the portion 24 and element 25 allows the spindle to become angled as shown in Figure 2, thereby compensating at least in part for any tendency of the spindle to bind.

With the method of fixing using collars, 45 the collars themselves are not concealed, but if they are arranged to lie at the side of the door to which entry is sought, the fixing at the vulnerable side of the door is concealed and thus secure.

50 The clearance provided between the interior surface of the tubular element 25 and the external surface of the portion 24 of a spindle 20 is designed to be sufficient to compensate for the inaccuracies likely to be encountered with such pull handles.

It can be seen that the spindle of the invention 55 enables the disadvantages of the known method to be overcome since pull handles with bores out of alignment can be fixed and the fitting of the handles can be carried out more quickly. Moreover, since the bores in one of a pair of handles are larger than in the other, a pair of handles can easily be recognised.

1. A door furniture spindle for use in fixing a pair of pull handles, each having a pair of spaced substantially parallel bores therein, at opposite sides of a door respectively, the spindle comprising a portion by means of which the spindle can be rotated, a tubular element on the spindle at one side of said portion, said tubular element being substantially restrained against axial movement on the spindle and being externally screw threaded, the spindle at the other side of said portion having a further screw thread, and the tubular element having an internal diameter greater than the external diameter of the part of the spindle on which it is disposed so that it can move radially relatively thereto or be inclined at an angle thereto.

2. A spindle as claimed in Claim 1 in which said tubular element is freely rotatable on said spindle.

3. A spindle as claimed in Claim 1 or Claim 2 in which said tubular element is substantially restrained against axial movement on the spindle in one direction by one or more washers, and in the other direction by said portion by means of which the spindle can be rotated.

4. A spindle as claimed in any one of the preceding claims wherein the screw thread on the tubular element and said further screw thread are of opposite hand.

5. A spindle as claimed in any one of the preceding claims wherein the maximum 100 external diameter of said tubular element is greater than the maximum diameter of said further screw threaded portion so that, in use, the pair of bores in the pull handle received on the spindles having said tubular 105 elements respectively, are of a larger diameter than the pair of bores in the pull handle received on the spindles provided with said further screw threads respectively.

6. A spindle as claimed in any one of the preceding claims in which said portion by means of which the spindle can be rotated is an enlarged, non-circular portion formed on the spindle, an end of said tubular element being disposed adjacent an 110 end of said non-circular portion and having a pair of angularly spaced notches therein, and said end of said non-circular portion having an annular groove therein, the arrangement being such that, in use, a tool 115 adapted for rotating the tubular element can be engaged on the spindle so that portions of the tool engage in said notches in the tubular element, said annular groove providing access for said tool to said notches 120 and allowing rotation of the tool.

7. A spindle as claimed in Claim 6, wherein, in use, a collar fits over said non-circular portion for rotating the spindle,

the collar contacting one side of the door when the pull handles are fixed to the door, the external cross-section of the collar being the same as the pull handle at said 5 side of the door.

8. A door furniture spindle substantially as hereinbefore described with reference to

and as shown in the accompanying drawings.

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1 SHEET

COMPLETE SPECIFICATION  
*This drawing is a reproduction of  
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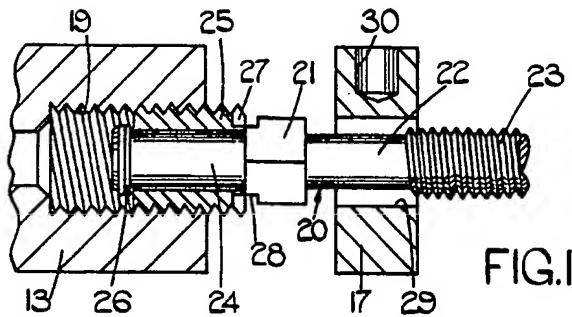


FIG.1.

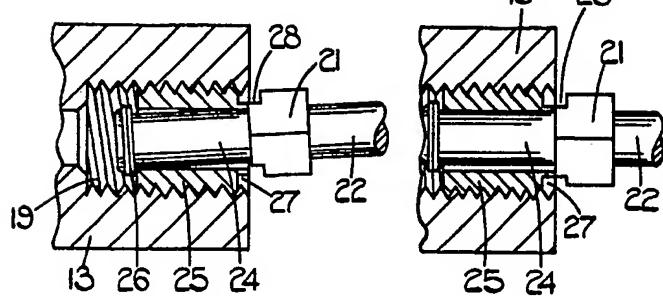


FIG.2.

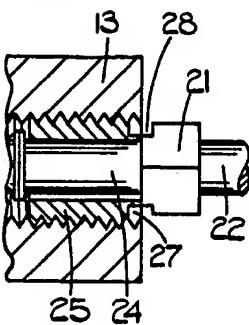


FIG.3.

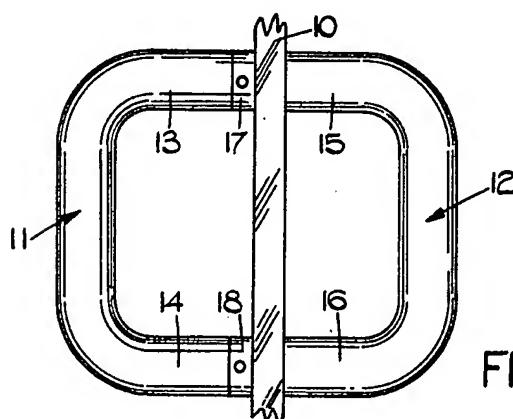


FIG.4.